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SOME FUNCTIONAL CHARACTERISTICS OF THE MAIN SERVICE CENTERS OF THE PROVINCE OF QUEBEC

by

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The purpose of this paper is to study some of the functional characteristics of the cities of 5,000 population and over ¹ which constitute a part of the urban network of the Province of Québec. These cities will be analysed with respect to their economic base and to their relative and absolute importance as service centers ; they also will be classified according to their functions as well as to their service diversification.

The study is based on the assumption that the cities of the Province of Québec constitute a complete urban network. Of course, the inhabitants of these cities consume products from all over the world and the products of their manufactures are sent for a great part outside of the Province. But it seems also quite sure that most of the services performed by the people of these cities are sold to other people inside the Province, with the exception of transportation. In other words, people engaged in all service activities, except transportation, work for people living in the same city or for export in the rest of the Province, but not for export outside of it. Montréal is the obvious exception, for its zone of influence greatly overlaps the borders of the Province. This may also be true of Québec, but to a very small extent.

A concept which is fundamental to this study is the basic-nonbasic concept.² Objections to the usefulness of this concept have been presented, but they were mostly on the grounds that it was practically impossible to determine which part of the urban economy was basic to a city. Therefore it would be even more impossible to apply the concept to a comparative study of many cities.

The method devised by Alexandersson,³ however, eliminates these objections. Trying to answer the question : « *what ratios in different industries are a necessary minimum to supply a city's own population with goods and services*

¹ Actually, not all the cities of the Province of Québec with 5,000 population and over have been included in this study. Hull has been left out because it belongs to the metropolitan area of Ottawa and is not an independant economic unit. Indeed the real economic units have been considered here, when possible, and not only the administrative units. Only suburbs with less than 1,000 people have been left out because employment figures for them were not available. In some cases this has forced certain cities to be omitted, even if the real economic units had a population greater than 5,000.

² For a general treatment of this question, see : ALEXANDER, J., *The basic-nonbasic concept of urban economic functions*, in *Economic Geography*, July 1954, pp. 246-261.

³ ALEXANDERSSON, G., *The industrial structure of American cities*, Lincoln, University of Nebraska Press, 1956.

TABLE I

« K-VALUES » USED FOR THE CITIES OF THE PROVINCE OF QUÉBEC						
Population	5,000/ 10,000 %	10,000/ 25,000 %	25,000/ 50,000 %	50,000/ 100,000 %	250,000/ 500,000 %	1,000,000 %
Manufacturing.....	1	1.6	2.2	2.9	7.1	11.6
Construction.....	2.1	2.4	2.7	3.0	3.8	4.2
Retail Trade.....	6.7	7.0	7.3	7.7	8.8	9.2
Services.....	10.7	11.3	11.9	12.6	15.5	16.6
Wholesale trade.....	0.7	0.9	1.1	1.3	2.2	3.0
Finance.....	1.4	1.5	1.6	1.7	2.3	3.0
Gouvernement.....	1.5	1.7	1.9	2.0	2.4	3.0
Transportation.....	1.5	1.7	1.9	2.1	2.7	4.1
Utilities.....	0.6	0.7	0.8	0.8	1.1	1.3
Tertiary sector.....	23.1	24.8	26.5	28.2	35.0	40.2
Total.....	26.2	28.8	31.4	34.1	45.9	56.0

of the type which are produced in every normal city? »⁴ he used the following procedure. First, cumulative distribution diagrams were constructed. « For every city the ratios of the 36 urban industries were calculated and expressed in per cent of its gainfully employed « urban » population. . . . For every industry the cities were arranged according to their rates. In the distribution tables thus obtained, a division was made into ten equal groups or decils. The diagrams were based on these tables. »⁵ Then « for every industry two points on the cumulative distribution diagrams were tentatively chosen, one and five per cent from the origin respectively, which represent cities number 9 and 43, as there are 864 cities⁶ all together. These values and not the very lowest ones were chosen to avoid extreme ratios » . . .⁷ representing agglomerations which are not towns in the ordinary sense or are anomalous in some way. Alexandersson then selected the 5% value as being the minimum ratio for each industry, which may be said to correspond to the nonbasic part of the industry. Therefore any city which has a percentage of people employed, in one activity, greater than this *K-value*, has an excess of workers in this activity who are exporting outside of the city and « earning its living », and may be called basic employees.

Morrissett⁸ has refined Alexandersson's figures by calculating them separately for the Northeastern part of the United States, and especially by computing the *K-values* for the different size classes of these cities, since the *K-value* increases with the size of cities.⁹

⁴ ALEXANDERSSON, G., *op. cit.*, p. 17.

⁵ ALEXANDERSSON, G., *op. cit.*, p. 14.

⁶ With a population over 10,000.

⁷ ALEXANDERSSON, G., *op. cit.*, p. 17.

⁸ MORRISSETT, I., *The economic structure of American cities*, in *Regional Science Association, Papers and Proceedings*, 1957.

⁹ « With increasing size of the town, city serving production can be expected to increase in relative importance, not to decrease », because « there will be a relatively larger exchange within the city than is possible within a smaller agglomeration. » ALEXANDERSSON, G., *op. cit.*, p. 19.

In this study on the cities of the Province of Québec, Morrissett's values for the United States' Northeastern part, which is quite similar to Québec, have been used for the cities with a population over 10,000 people, taking advantage of a large statistical basis. Only for retail trade and services was it necessary to compute different *K-values*, because of differences in the tabulation of figures in the American and Canadian censuses. However for cities with a population between 5,000 and 10,000, it was necessary to devise special *K-values* for all activities.¹⁰

After calculation of the basic employment in every city for each group of industry, graphs were constructed from these tables. In each graph, the cities were plotted according to the number of basic employees in one activity along the X-axis, and according to the percentage of the total basic gainfully employed population that this number of basic employees in one activity represents, along the Y-axis.

This way, the relative importance of the cities in every group of industry as well as the relative importance of each function in the economy of every city are clearly presented, simultaneously.

THE RANKING OF THE SERVICE CENTERS

The urban network may first be examined as a whole and the cities of which it is composed ranked according to their relative importance in the region, for each group of services. Comparisons have to be made between the various graphs, so as to grasp the main similarities and differences that exist among the various rankings. For example, the relative importance of the cities as retail trade centers has to be compared with their ranking as total population concentrations, as total service centers, as well as wholesale, finance, etc., centers. Only brief comments¹¹ will be presented here, pointing out the main facts about this network.

Retail trade

The relative importance of Montréal (1,400,000) in retail trade is much smaller than in most other service activities — its basic employment is only twice as large as Québec's (275,000). This is not surprising since in all big cities retail trade exists mainly to serve the inhabitants of the cities themselves, as has been shown for the largest cities of the United States,¹² because retail businesses are by nature very ubiquitous. After Québec comes Trois-Rivières (68,000), closely followed by Chicoutimi (30,000) and Sherbrooke (56,000). Chicoutimi's importance in retail trade thus appears to be out of proportion with its size,

¹⁰ For the cities below 25,000 the percentage of the next to the last city was usually selected as the *K-value*; for the other size classes the *K-values* were kept proportionate to Morrissett's figures.

¹¹ To facilitate comparisons, the population of every city (in 1951) is always indicated after its name. Actually all figures used in this paper are for 1951, since no data about employment were available for 1956.

¹² ALEXANDERSSON, G., *op. cit.*, p. 105.

TABLE II

ABBREVIATIONS AND POPULATION OF CITIES					
Al	Alma	10,165	Mo	Montréal	1,395,906
A	Arvida	11,078	P	Plessisville	5,094
As	Asbestos	8,190	Q	Québec	274,827
BPA	Bagotville – Port-Alfred	8,073	R	Rimouski	11,565
Be	Beauharnois	5,694	RL	Rivière-du-Loup	9,425
Bu	Buckingham	6,129	RN	Rouyn – Noranda	24,305
Ch	Chicoutimi	29,762	SA	Sainte-Agathe-des-Monts	5,169
C	Coaticook	6,341	StH	Saint-Hyacinthe	22,358
D	Drummondville	15,616	SJI	Saint-Jean-Iberville	24,490
G	Granby	21,989	Sj	Saint-Jérôme	17,785
J	Joliette	16,064	ST	Sainte-Thérèse	7,038
JK	Jonquière – Kénogami	31,513	Sh	Shawinigan	49,719
L	Lachute	6,179	Shk	Sherbrooke	56,128
LT	La Tuque	9,538	S	Sorel	18,310
M	Magog	12,423	TM	Thetford Mines	15,095
Mal	Malartic	5,983	TR	Trois-Rivières	68,306
Mat	Matane	6,345	Vo	Val-d'Or	8,685
Még	Mégantic	6,164	Vy	Valleyfield	22,414
My	Montmagny	5,844	V	Victoriaville	15,445

as will be the case in all other service activities : this tends to prove that Chicoutimi is the regional capital of the Saguenay – Lac-Saint-Jean area. Shawinigan (50,000) comes only after Jonquière-Kénogami (31,000) and barely before Joliette (16,000), which points out that Shawinigan's trade area may be overshadowed by its neighbor's Trois-Rivières. At the bottom of the list are Saint-Jean-Iberville (24,000), Arvida (11,000) and Beauharnois (6,000) with no basic retail trade.

*Services*¹³

Montréal (1,400,000), and Québec (275,000) have exactly the same importance in the Province as service centers even though Montréal's population is five times larger than Québec's. As in retail trade, large cities have relatively little importance in services for export, because service industries are very ubiquitous. Sherbrooke (56,000) comes next, ahead of three almost equal cities, Saint-Hyacinthe (24,000), Trois-Rivières (68,000) and Chicoutimi (30,000). They are followed by Joliette (16,000), Rimouski (12,000) and Rivière-du-Loup (9,000), far ahead of much bigger cities.

Wholesale trade

Here of course Montréal stands out, but, unlike in retail trade and services, it profits very much from the fact that its hinterland is the whole Canada ; as it has been impossible to determine for this paper which part of its wholesale trade

¹³ Community, recreation, business and personal services. Government has been treated separately.

FIGURE I

KEY FOR THE READING OF THE GRAPHS

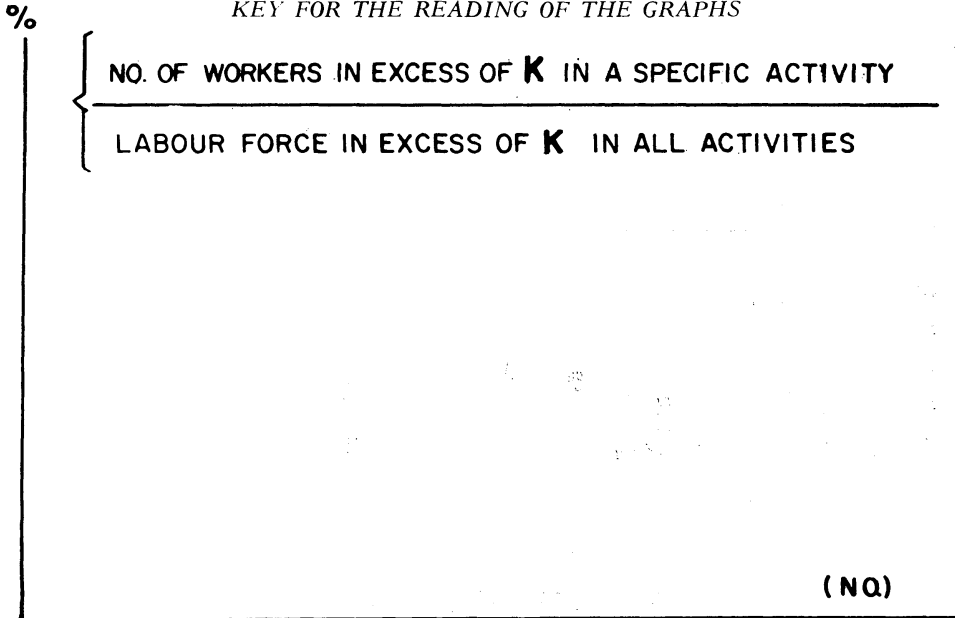
NO. OF WORKERS IN EXCESS OF **K** IN A SPECIFIC ACTIVITY

FIGURE II

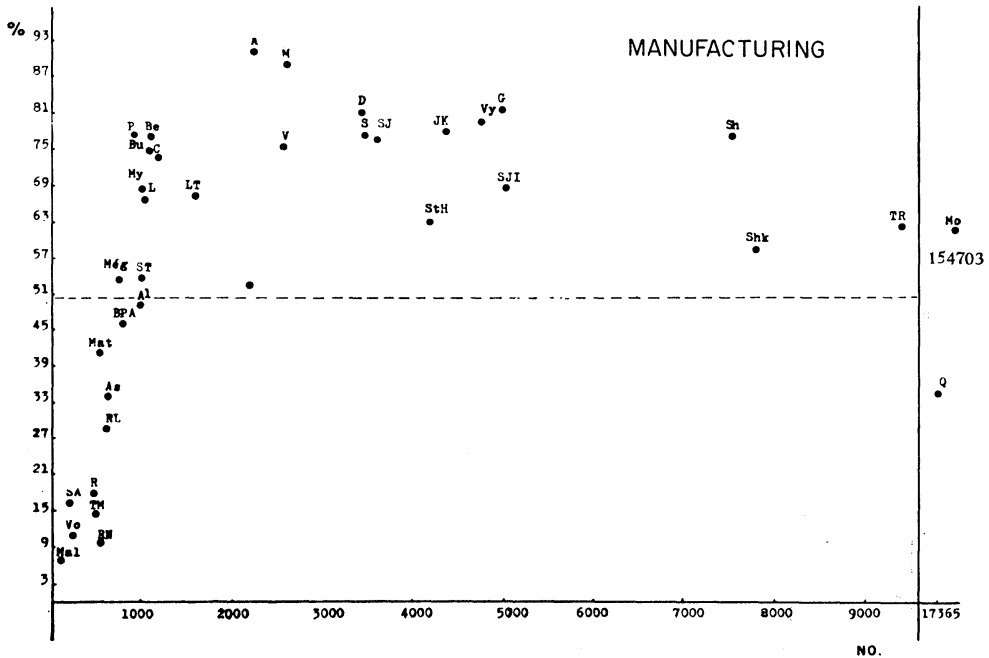


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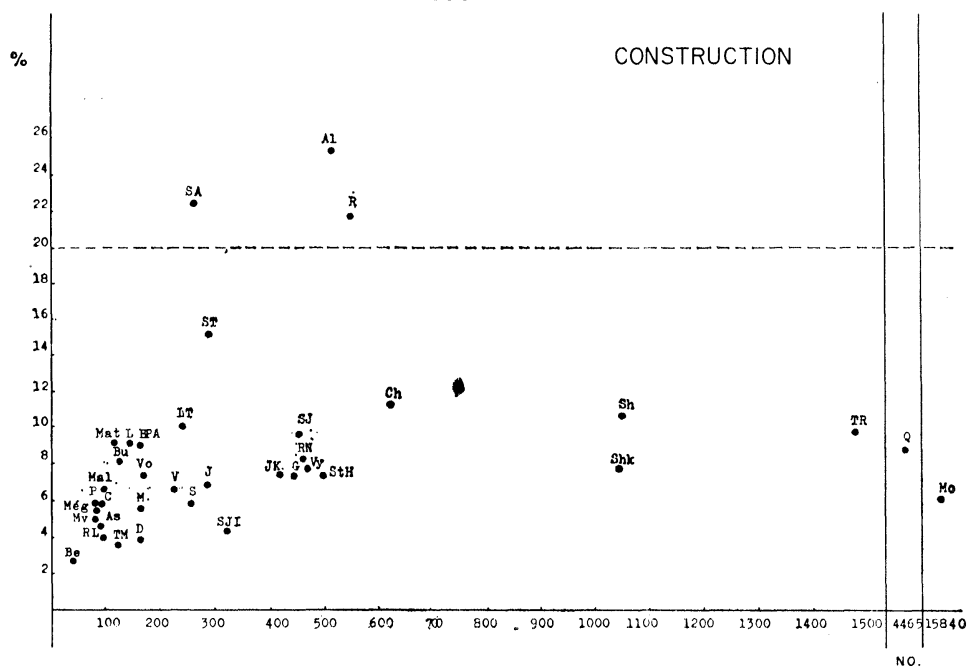


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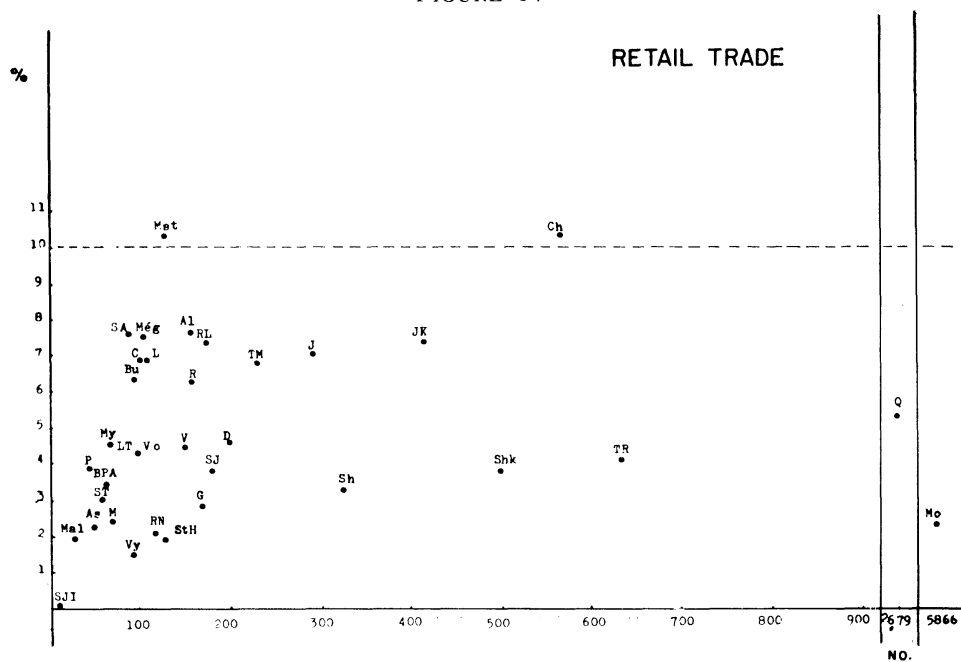


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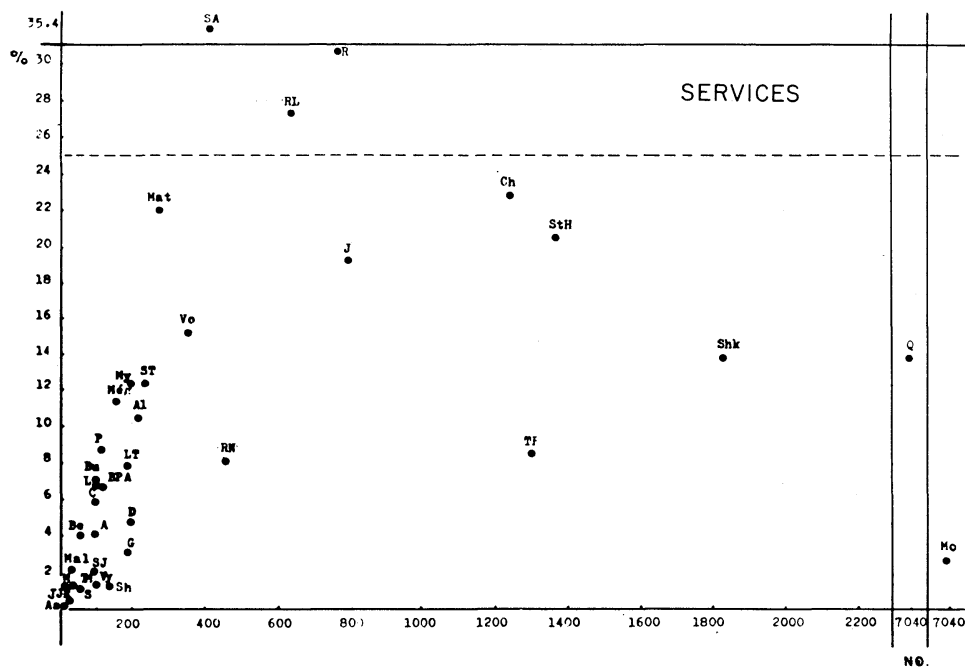


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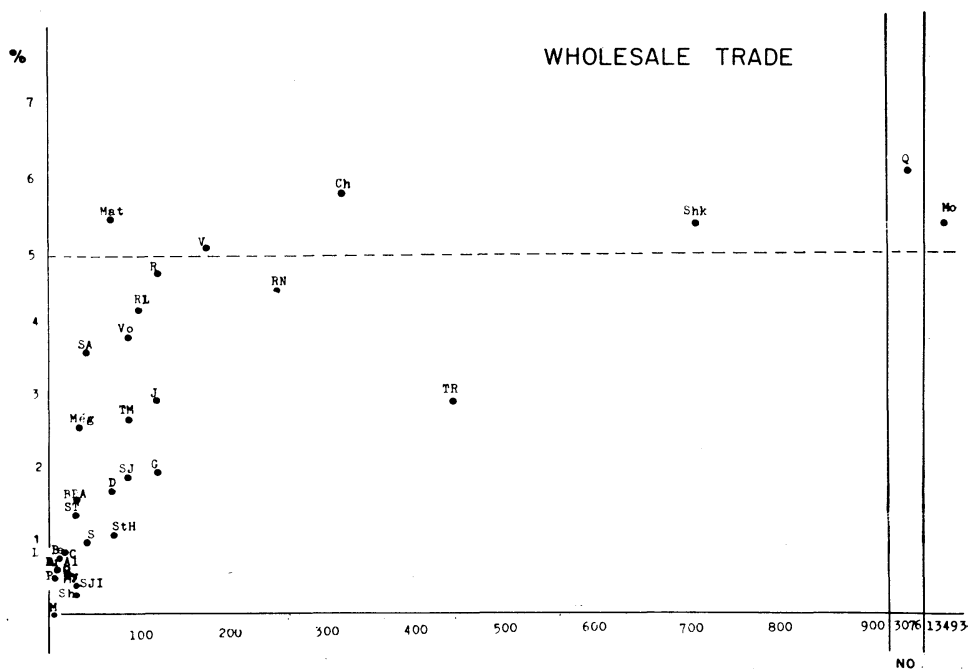


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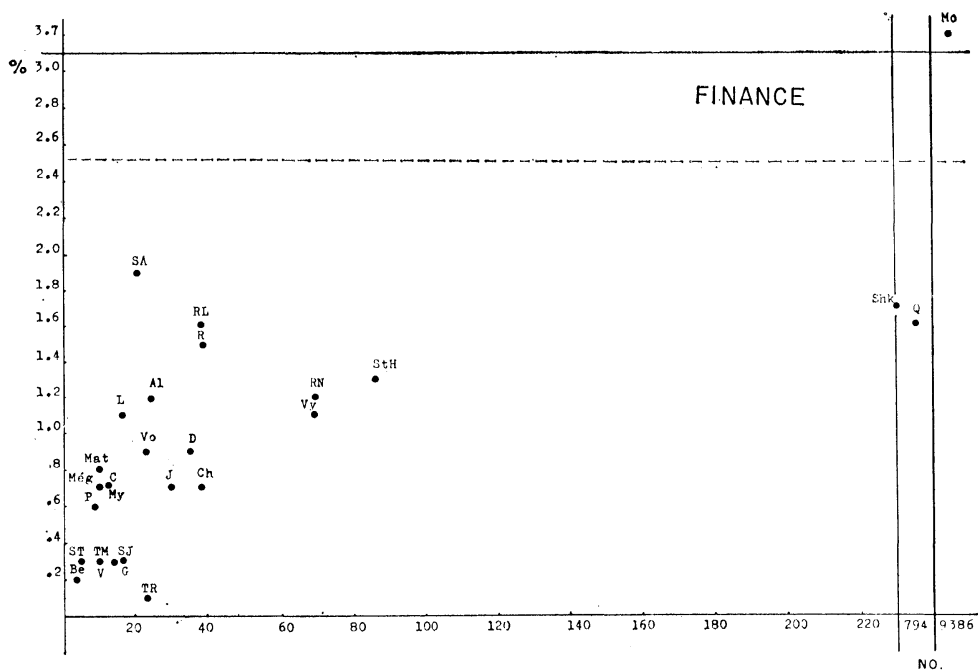


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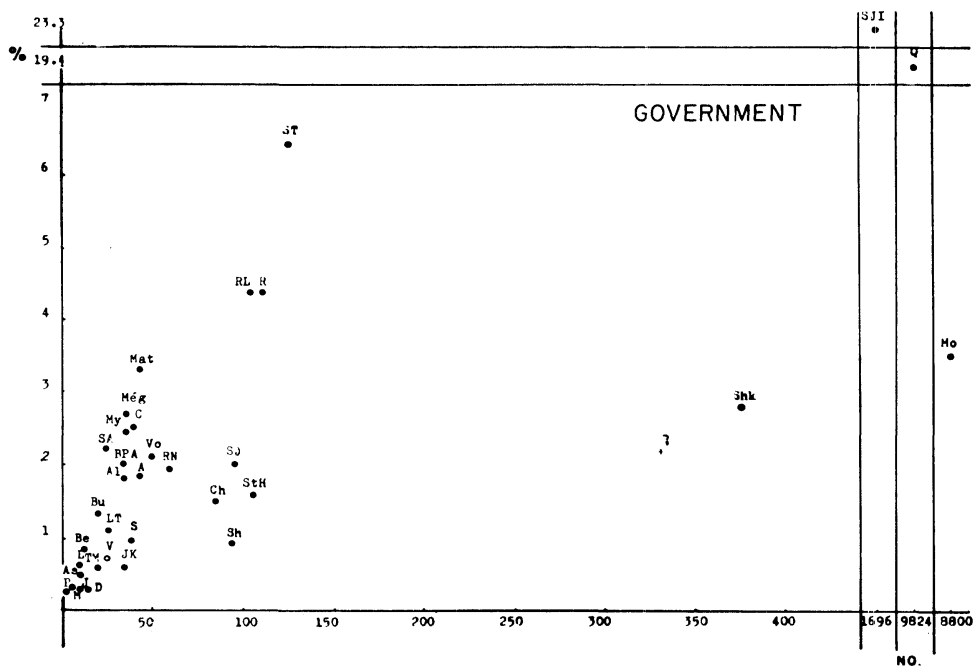


FIGURE IX

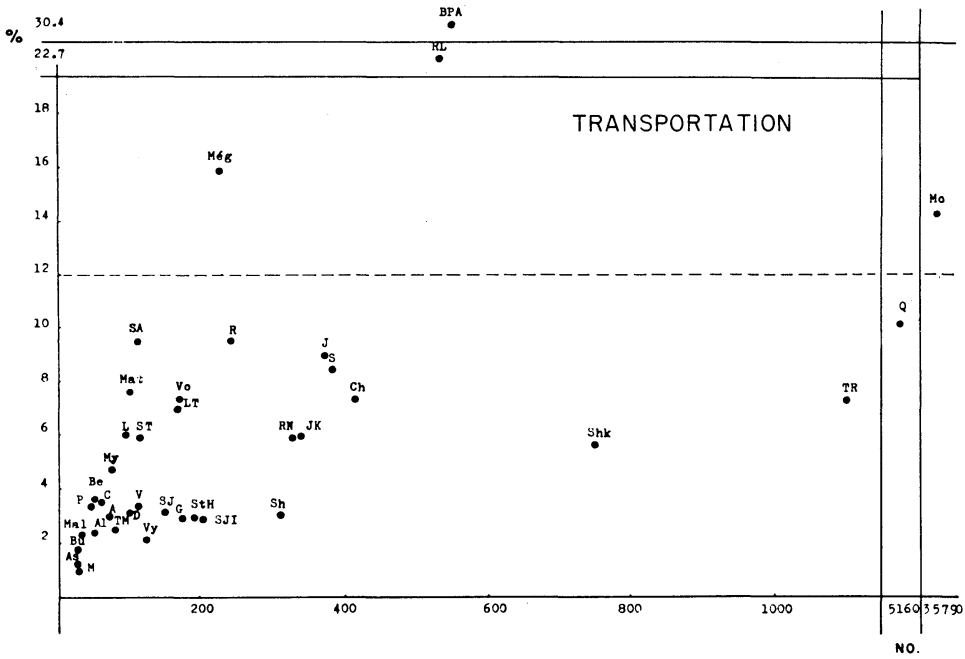
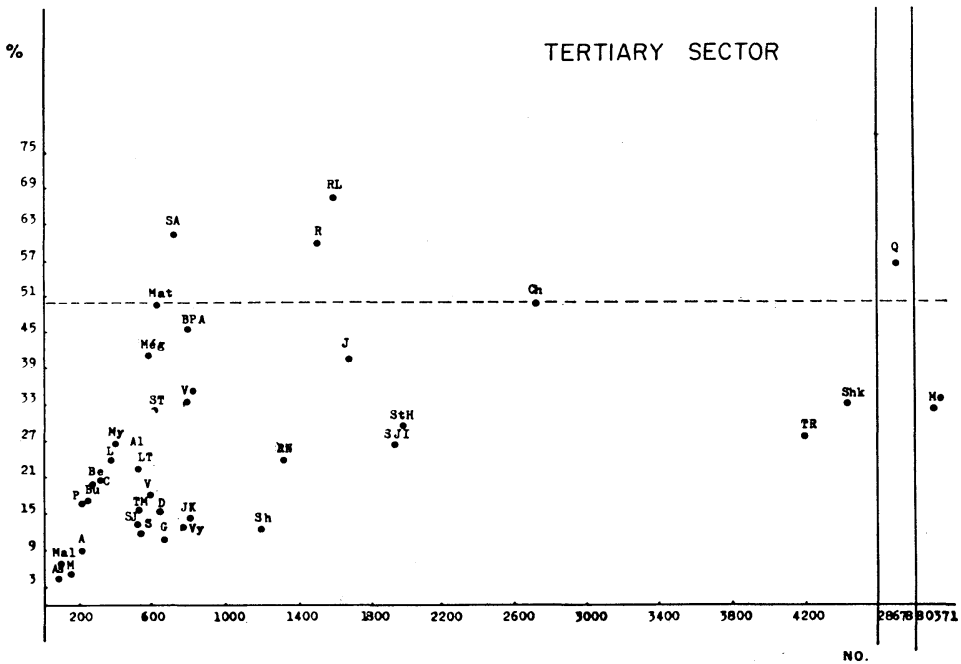


FIGURE X



is serving the Province, no conclusions may be drawn. Next to Québec (275,000) is Sherbrooke (56,000), far ahead of Trois-Rivières (68,000). This probably reflects the geographical location of Trois-Rivières between Québec and Montréal. Chicoutimi (30,000) is the next most important wholesale center of the Province, due certainly to its undisputed large trade area, the Saguenay – Lac-Saint-Jean district. Victoriaville (15,000) also stands out, after Rouyn-Noranda (24,000) which thus seems to serve the whole Abitibi region. Saint-Jean, Magog and Arvida, just like in retail trade, have almost no basic wholesale trade. Shawinigan (50,000) is also among the last, with Malartic (6,000), La Tuque (9,000) and Asbestos (8,000).

Finance

Sherbrooke (56,000) is the only important financial center in the Province, after Montréal which serves the whole country, and Québec. Far behind are Saint-Hyacinthe (24,000), Valleyfield (22,000) and Rouyn-Noranda (24,000) while Trois-Rivières (68,000) is no more important than most of the other cities. A striking fact here is the great number of cities without any basic financial activity or with a very small one. This proves that the zone of influence of large cities for financial activities is probably much larger than for any other activity.

Government

Due to its role as provincial political capital, Québec (275,000) is a slightly larger government center than Montréal (1,140,000). Saint-Jean (24,000) owes its importance in the industry to its military college and air base, which distort the picture since these institutions can hardly be considered as « serving » the Province. Trois-Rivières (68,000) and Sherbrooke (56,000) have about the same importance, while Shawinigan (50,000) is not ahead of Rimouski (12,000), Rivière-du-Loup (9,000) and Sainte-Thérèse (7,000). Granby (22,000) and Valleyfield (22,000), Malartic (6,000) and Plessisville (5,000) have no importance as government centers.

Transportation

Trois-Rivières (68,000) is far behind Montréal (1,400,000) and Québec (275,000) as a transportation center, but quite ahead of Sherbrooke (56,000). Then come Chicoutimi (27,000), Sorel (18,000) and Joliette (16,000), after Bagotville – Port-Alfred (8,000) and Rivière-du-Loup (9,000).

Tertiary sector

Adding up all those activities (*plus* utilities), we will have the true picture of the relative importance of our cities as total service centers. Thus we find that, despite its role for the whole of Canada, Montréal (1,400,000) still has only three times as many basic employees in the tertiary sector as Québec (275,000), which serves the Province almost exclusively. Trois-Rivières (68,000) and

Sherbrooke (56,000) are of equal importance, with a basic total service employment one-seventh of that of Québec, which points out further the great relative importance of the provincial capital as a service center. Chicoutimi (30,000) is the next most important center, due to its large service area, followed by Saint-Hyacinthe (24,000), Saint-Jean (24,000),¹⁴ Joliette (16,000), Rimouski (12,000) and Rivière-du-Loup (9,000) which have about the same importance. Shawinigan (50,000) is only slightly ahead of all the others. Arvida (11,000) and Magog (12,000) have very little importance, with only 200 basic employees in the tertiary sector, the first one overshadowed by Chicoutimi and the second one by Sherbrooke; Asbestos (8,000) and Malartic (6,000) are even less important, with 100 basic employees, and thus play no role in the Province as service centers.

THE PROBLEM OF HIERARCHIES

The graphs have thus revealed the true relative importance, for each group of service activity, of the cities which constitute the considered network. In every case, it could be seen that the rankings were very different from the ranking by total population. To be sure, these rankings could have been suspected and postulated, perhaps rather accurately, by qualitative studies. But the fact is that we are now provided with an exact, global quantitative picture, which permits meaningful comparisons, after this analysis.

Furthermore, we may now investigate the question of the hierarchies of service centers. If hierarchies do exist among the cities of an urban network, this means that there are categories of cities in the various activities; that is, cities of a first order, second order, etc., could be defined, and every city would belong to one of these categories. In other words, there would not be a continuum among cities, from the least important to the most important in every activity, but groupings of cities about certain values and nothing between the groupings. Many authors have thus proposed a terminology for these types of service centers that were said to exist. Actually, it was never empirically proved that such hierarchies do exist.

The cities of the Province of Québec have been ranked according to their absolute importance, in every group of service activity, as measured by the number of basic employees in every activity. Therefore, since it can be assumed that two centers of equal importance in one activity, that is of the same order, should have an equal number of basic employees in this activity, it will be possible to conclude that hierarchies do exist if it appears from our graphs that there are groupings of cities about certain values, with wide intervals separating them.

Such is not the case. On the opposite, on every graph, the cities are distributed quite at random among the values. Of course, more cities appear in the lower end of the graph, but there are no obvious groupings. Therefore, it seems that there are no such things as hierarchies of financial centers or retail

¹⁴ Saint-Jean appears to be a large service center because of the military people, classified in government. In fact, it is not an important service center.

trade centers, or total service centers in this urban network, but only a continuum of centers, so that no types can be set up. There is no reason why similar studies of other functional regions in North America and Western Europe, where prevail similar types of economy and society, should not arrive at comparable results, and consequently it seems that the term « urban hierarchy » should be forgotten.

THE ECONOMIC BASE OF THE INDIVIDUAL CITIES

Another approach to the study of an urban network, besides considering the network as a whole, for each group of industry, is of course to consider the individual cities as wholes. One city can be examined after the other, and its importance in the network evaluated in different services, but this is of interest only if correlations are made with other phenomena, so as to compare various cities. However, the functions of an individual city can be not only compared with the same functions in the other cities of the network, but also among themselves. We will thus briefly examine the economic base of a few of our cities.

Arvida. 91% of the basic employees in this city work in manufacturing industries, and there is no export in finance, retail or wholesale trade.

Saint-Jean. 69% of the basic gainfully employed population is employed in manufacturing and 23% in government.

Rimouski. Manufacturing employs only 18% of the basic gainfully employed population, against 60% in the tertiary sector and 21% in construction. Services alone make up 31% of the basic employees.

Québec. The tertiary sector includes 57% of the exporting workers with 10% in transportation, 19% in government and 14% in services. Manufacturing has about 34%.

Sherbrooke. The exporting gainfully employed population is made up of 59% in manufacturing and 33% in the tertiary sector (14% in services, 4% in retail trade, 5% in wholesale trade, 6% in transportation).

These examples have been selected simply to show the great variety of economic bases among these cities which belong to the same network. If the study of the economic base of a city is very important to understand that city, a comparative study of cities according to their economic bases is just as necessary to understand a whole network. This means of course, as a first step, the setting up of types, or in other words, the establishment of a functional classification of cities.

THE FUNCTIONAL CLASSIFICATION

A functional classification of cities involves two things : the basis upon which the classification is to be built, and the actual values that are considered significant enough for the distinction of the classes.

It would be difficult to find a better basis for classifying cities according to their functions than the relative importance of these functions in the economic

base of these cities. In other words a city will be considered as being outstanding in one type of activity when the proportion of basic people employed in this activity to the total basic employment will be of a certain importance. The difference between this classification and other classifications that have been proposed is that it makes use of refined, more meaningful figures. Therefore, its value is universal and just as good for large or small cities, the non-basic part of the active population of every city having first been eliminated.

For example, Montréal (1,400,000) and Malartic (6,000) have respectively 17.8% and 12.3% of their total gainfully employed population in services but they respectively have 2.8% and 2.2.% of their total basic employment in services. This simply means that, out of the total number of people earning the living of each of these two cities, about the same percentage earns it in services, therefore they belong to the same class with respect to this function.

The second step in the establishment of the classification, that of deciding which actual values should be considered as limits of the classes, is arbitrary. Only with a large sample could there be hope of « obvious » classes. Therefore the classes proposed here, based on 38 cities, are only tentative, until a larger number of cities is studied. However, the reason why certain values are selected is known, which makes the classification more acceptable than others.

The first breakdown would be between manufacturing and the tertiary sector. A city with more than 50% of its export in manufacturing would be classified as a primarily manufacturing city ; a city with more than 50% of its living earned in all services would be primarily a service center.

According to this classification system, out of 38 cities considered here, 26 are primarily manufacturing centers and only 6 are primarily service centers (Québec, Rimouski, Rivière-du-Loup, Sainte-Agathe, Chicoutimi and Matane, the last two with 49.7%).¹⁵

The breakdown for manufacturing has not been attempted here. But for each type of service, the tentative classes may be seen from the graphs. It is obvious that a city, while playing an important role in the region for a certain type of service, may nevertheless not be classified as outstanding in that service if it is so large that this service will not be relatively important in its economic base ; conversely, a small city may be classified as outstanding in a service, and still not play a great role in the region. But these two things are different : the importance of cities in the region for a service should be correlated with the size of their trade area, while the structures of cities should be correlated with the fact that they are of a certain type.

Finally, it may happen, of course, that a city will not be classified as outstanding in any activity. Some of our cities are in this case with respect to services ; it would be more surprising to see a city with no outstanding service and no outstanding manufacturing activity. But the fact remains that a city

¹⁵ Thetford-Mines, Rouyn-Noranda, Asbestos, Malartic and Val-d'Or are mining towns which qualify neither as manufacturing nor as service centers. Bagotville - Port-Alfred, with an almost equal percentage in manufacturing and the services, also qualifies for neither, due to a high percentage in construction.

may be very diversified, and that diversification is one very important characteristic of cities.

THE SERVICE DIVERSIFICATION

Functional diversification of cities may be defined in more than one way. It may, for example, be considered as the opposite of specialization. Diversification, as defined here, involves more than that : perfect diversification is considered as being the one that exists in a whole region. Therefore, the best diversified or balanced service center ¹⁶ in the region is the one in which the distribution of the basic labour force among the various services is the closest to this same distribution in the whole society or region of which this city is a part.

TABLE III

THE SERVICE DIVERSIFICATION					
Balanced (5,5 — 7,4)		Ill-balanced (9,3 — 15,7)		Non-balanced (20,8)	
1	Rouyn-Noranda.	8	Drummondville	19	Saint-Jean-Iberville
2	Montréal	9	Rimouski		
3	Québec	10	Joliette		
4	Trois-Rivières	11	Chicoutimi		
5	Sherbrooke	12	Sorel		
6	Saint-Jérôme	13	Shawinigan		
7	Granby	14	Saint-Hyacinthe		
		15	Thetford Mines		
		16	Jonquière — Kénogami		
		17	Victoriaville		
		18	Valleyfield		

In other words, the standard against which the diversification of every city is measured is the basic employees distribution among services in the Province of Québec.¹⁷ The average deviation from that standard is then computed for every city,¹⁸ and this deviation represents a diversification index.

¹⁶ Manufacturing diversification should be distinguished from service diversification. It will not be analyzed at all in this paper, which is devoted to the study of cities as service centers.

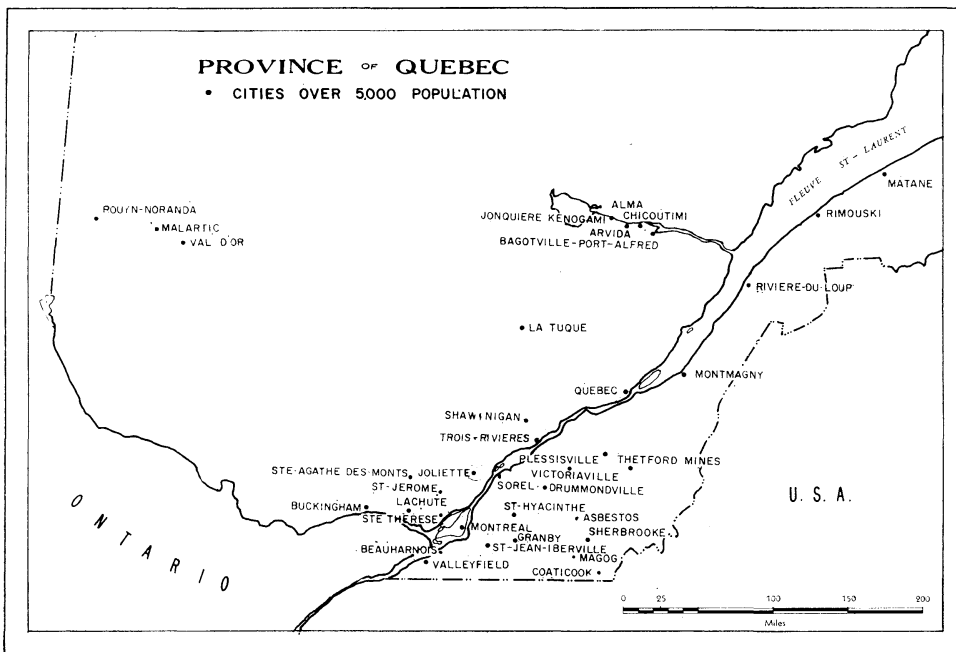
¹⁷ The labour force of the whole Province of Québec in every group of services was divided into a basic and a nonbasic part by using Alexandersson's *K-values*. These basic workers could then be defined as the people who, instead of serving the people living in their own settlement, export their services outside of it. Since it was impossible, within the limits of this paper, to evaluate the percentage of Montreal's business done outside the Province, no adjustment for this could be made. This is of course a crude way to evaluate the basic part of this region's gainfully employed population, but the only other way would have been to add up the basic population of every settlement in the Province for all services, which is of course an almost impossible task.

¹⁸ With a population over 10,000. Arvida and Magog were omitted, because they have too few basic people in services.

The ranking of the indexes (see Table III) permits to distinguish three groups of cities : the well-balanced, the ill-balanced and the non-balanced. Not surprisingly, Montréal, Québec, Trois-Rivières and Sherbrooke are ranked in this order, but after Rouyn-Noranda ; this is probably due to the isolated position of this last city. Saint-Jean, with 87% of its basic service population in government ranks last, after Valleyfield (50% in utilities).

As it has been said before, this is not a specialization index ; the specialization is revealed by the functional classification. Therefore a city can be specialized in some services and still have a very good balance. For example,

FIGURE XI



Montréal is the next to the most diversified center in the region, while it is classified as outstanding in finance, transportation and wholesale trade. Québec comes next in diversification and is classified as a government center and as a wholesale trade center. On the other hand, Thetford-Mines, while an ill-balanced service center, has no service specialization, but it has a great deficit (negative deviation) in transportation, finance, government and services, and a great excess (positive deviation) in retail trade and utilities.

This index has thus permitted the ranking of the service centers according to their balance among the services. Except for the few larger cities which are the most diversified, there is no correlation between size and balance. This points out that the zones of influence of the same city for different kinds of

services may vary greatly in size, or in other words, that they do not all have the same extent.

CONCLUSION

The sharpening of his tools of description is still one very important problem facing the geographer. The *K-value* technique, devised by Alexandersson, for differentiating the basic from the nonbasic part of the urban economy, is one method that permits a more accurate description of cities. When applied to the study of an urban network, this determination of the basic part of the urban economy permits not only to study the economic base of the individual cities, but also provides the best basis for the establishment of a functional classification and a diversification classification, for the study of the relative importance of the cities in the various activities and for the investigation of the problem of hierarchies.

This study has been an attempt to describe and classify these characteristics for part of the urban network of the Province of Québec. To be sure, few conclusions could be drawn from such a descriptive study that were of general interest. But this has been presented as a preliminary study which could be enlarged and deepened. The addition of more cities would permit a less arbitrary classification and would make the study of the ranking of the service centers more interesting; it would also make possible a definitive answer to the question of hierarchies. A greater breakdown to each industry, instead of group of industry, would of course be more interesting. Finally, the manufacturing industries should also be studied for themselves, instead of only for comparison with services. The results of these studies should then be correlated with the results of investigations about the urban trade areas or zones of influence. One thus finds himself, after these analyses, facing again the whole complexity of the urban phenomenon. Nevertheless, it is believed that from all this greater insight has been gained about urban networks, their functioning and their structures.

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